

XIV. *On the egg-cases and early stages of some South China Cassididæ.* By J. C. KERSHAW and FREDERICK MUIR.

[Read March 20th, 1907.]

THE four beetles mentioned in the following paper are all common in Macao. As their egg-cases or larvæ have not been previously figured or described, the following short description of the plate may be of interest to Coleopterists. Dr. David Sharp has kindly identified them for us.

1.—*Coptoeycla circumdata*, Herbst.

The eggs of this species are laid singly, generally on the under-side of the leaf of its food-plant, a species of *Ipomœa*. The egg, attached to a membrane similar in shape and texture to the egg-membrane of *Aspidomorpha puncticosta*, is fixed to the leaf, and the lower part of the membrane is turned back over the egg and pressed down. The edges of the membrane adhere to the surface of the leaf, and the shape and green colour of the egg can be distinctly seen through it. A double keel runs down the centre of the membrane, giving the egg-case the appearance of a double-keeled boat turned over.

An examination of the lower oothecal plate shows that the thickening of the membrane forming the double keel corresponds to two indentations on the posterior edge of the plate. In *Basipta stolidæ* the V-shaped membrane with a central keel, and in *A. puncticosta* the thickening of the lateral edges, corresponds to the shape of the oothecal plates; the thickening of the lateral edges of the latter being due to the oothecal plates not quite meeting at this point.

For these reasons we consider that the shape of the membranes of a Cassidid egg-case is determined by the shape of the oothecal plate.

Sometimes in captivity a second egg is laid overlapping the side of the first. The egg-case is never covered with excremental matter.

This species carries its cast skins during its larval and pupal life on a pair of long posterior spikes, in a similar manner to *A. puncticosta*, and does not attach any excremental matter to them, thus falling into the same series

as the African species *A. puncticosta* and *confinis*. The bare egg-case also places it with these species, but its simple nature and the absence of any eggless membrane to act as attachment to the leaf indicate an affinity to the genera *Cassida* and *Laccoptera*.

The larva and imago generally feed on the under-side of the leaves. If the pupæ be kept in a light-proof box the bright or metallic colours do not appear in the imago.

2.—*Aspidomorpha micans*, Fab.

This species generally lays its eggs in batches of two, but sometimes three and even four eggs are placed together. Each egg is attached to the usual shaped Cassidid egg-membrane which has a slight thickening longitudinally, a midrib, and is doubled back over the egg. In captivity the first egg is sometimes attached direct to the leaf, but more often an eggless membrane is first attached to the leaf and the eggs laid in it. The second egg is placed to one side—*i. e.* the right—of the first, the third is placed upon and between the first and second, and the fourth, if present, to the leaf of the first. In captivity the egg-case is sometimes partly covered with excrement, but we have never found one so covered in the field.

During the larval and pupal life the skins are carried on the long posterior spikes, but no excremental matter is attached to them; occasionally during the first instar small pieces of excrement are carried at the end of these posterior spikes.

A pair *in cop.* at 10 a.m. on the 5th September produced two egg-cases by 4 p.m. These remained in the egg state seven days, in the larval state nineteen days, and in the pupal state six days.

Both by the egg-case and larval appendage this species falls into the African *Aspidomorpha* group.

3.—*Laccoptera chinensis*, Fab.

The egg-cases of this species contain two, three and sometimes four eggs, and are generally, but not invariably, covered with excremental matter. This covering is variable in size, sometimes covering the entire case, at other times being only a small patch in the middle of the membrane. The first egg is attached direct to the leaf and the membrane turned back in the usual way.

Soon after the larva hatches it attaches a small piece of

excrement to the tip of each of the long posterior spikes, a telescopic movement of the last two segments of the body enabling it to perform this operation. As its size increases these pieces of excrement coalesce and form a roughly triangular lump. The cast skins are worked into the mass and held to form the "shield." Up to the last instar the larva is yellow, then it changes to black, the white sporacles showing up distinctly. The size of the shield varies: sometimes it entirely covers the larva, at other times it leaves it half exposed.

Both by egg-case and larval "shield" this species falls into the same division as the African genera *Cassida* and *Laccoptera*.

4.—*Cassida obtusata*, Boh.

The egg-cases of this species contain two eggs attached to the ordinary-shaped Cassidid egg-membranes. The case is bare, no excremental matter being placed upon it. The imago feeds upon *Citrus* trees and injures them considerably.

Unfortunately we were not able to observe the larva, so cannot state the shape and nature of its appendages, but we anticipate that it is similar to *Coptocycla circumdata*.

The study of these interesting egg-cases and larval appendages naturally suggests the questions as to their origin and use. That they are a protection to egg and larva brought about by natural selection is the first solution that suggests itself. Were *A. puncticosta* the only species under consideration this might appear an adequate explanation, but after studying several African* and these China forms the authors are not satisfied with it.

In *A. puncticosta*, where the egg-case is carried to its highest perfection, the eggs are as heavily parasitised as any that we have observed, and in Mozambique, ants eat into the case and destroy the eggs. In a similar manner ants destroy the eggs of *Mantidæ*. It is not an absolute protection that we look for, but only a relative one. To argue that this species would be exterminated were its egg-case less perfect appears illogical, for other species are just as abundant although their egg-cases are much less perfect. The wide range of this species we consider due to the, practically, uninterrupted growth of its food-plant, *Ipomæa pes-capræ*, along the African coast. It is

* Trans. Ent. Soc., 1904, pp. 1-19,

possible that this ootheca may serve as a protection to dampness or drought, to spray or sand, in its exposed habitat, but in China *Coptocycla circumdata* live upon the same food-plant and is exposed to the same conditions. It appears to be immaterial to the hatching of the larva of *Laccoptera chinensis* whether the egg-case be partly or wholly covered with excrement or left entirely uncovered.

The larva and pupa of *A. puncticosta*, *B. stolidus* and *Laccoptera excavata* have each a distinct style of larval appendages, and each is as heavily attacked by parasites as many beetles' larvæ not protected in such manner.

As eggs and larvæ are scarce during October and November in Macao we were unable to collect enough material in the field to discover what parasites attack the species mentioned above and in what proportion. Several adults and larvæ were found killed by a fungus growth.

Until the structure of the egg-cases and larval appendages of more species have been described, and the death factors that keep these beetles in check are better known, it were better not to insist that protection against enemies or drought is the "raison d'être" of the development.